Efficient Polishing of Metallic Substrates for Active Remote Sensing Applications, Phase I

Completed Technology Project (2018 - 2019)

Project Introduction

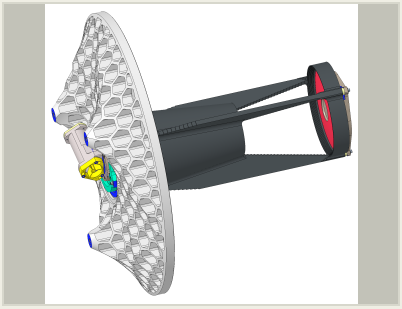
Welch Mechanical Designs (WMD) proposes to develop a highly efficient and innovative process for polishing the substrate of high performance optical quality metal mirrors directly, eliminating the need for nickel coating and reducing the number of steps involved, thereby significantly reducing cost, risk, and manufacturing time of telescopes and other optical structures that are suitable for a wide range of imaging applications.

This direct polishing process will have a significant impact on the cost, time, and risk, associated with the fabrication of optical assemblies such as compact and lightweight Cassegrain telescopes compatible with existing differential absorption lidar (DIAL) and HSRL lidar systems. The process also allows aluminum to be used to rapidly make larger aperture, stable, monolithic telescopes and optical structures that are suitable for a wide range of imaging applications in aircraft and space deployments.

Anticipated Benefits

This direct polishing process will have a significant impact on the cost, time, and risk, associated with the fabrication of optical assemblies such as compact and lightweight Cassegrain telescopes compatible with existing differential absorption lidar (DIAL) and HSRL lidar systems. The process also applies to fabrication of larger aperture, stable, monolithic telescopes and optical structures that are suitable for a wide range of imaging applications in aircraft and space deployments.

The direct polishing process is an enabling technology which has applications across a range of market segments including military and commercial applications. Optical assemblies using polished metal substrates are used in imaging systems by the military for surveillance and targeting, and in civilian applications including astronomy and earth observation. Basically anywhere a telescope is used this process can reduce cost and risk.



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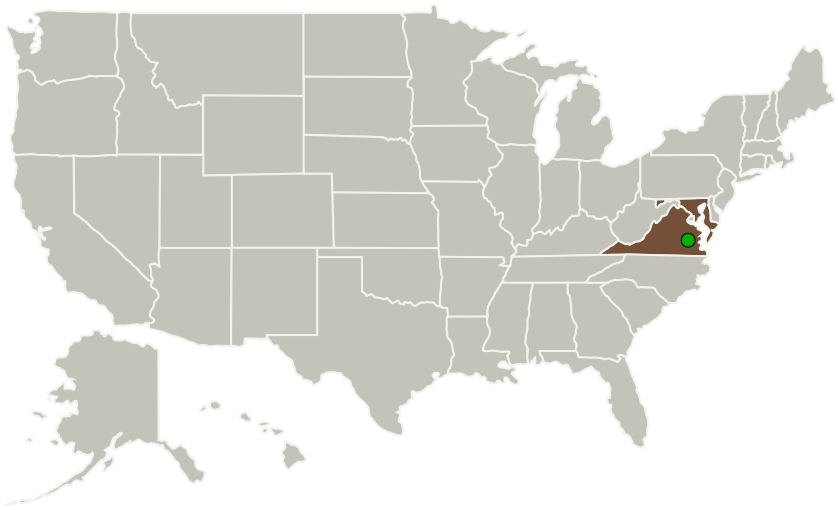
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Welch Mechanical Design, LLC	Lead Organization	Industry	Aberdeen, Maryland
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Maryland	Virginia

Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/141030)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Welch Mechanical Design, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

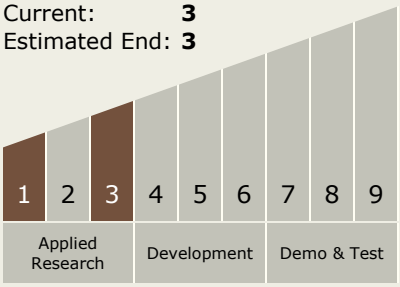
Carlos Torrez

Principal Investigator:

Wayne Welch

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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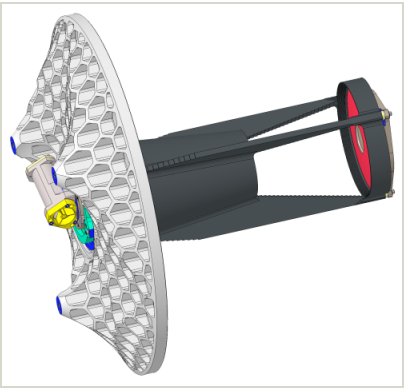
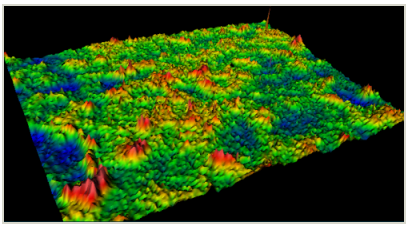
Images



Briefing Chart Image
Efficient Polishing of Metallic Substrates for Active Remote Sensing Applications, Phase I
(https://techport.nasa.gov/image/131641)



Final Summary Chart Image
Efficient Polishing of Metallic Substrates for Active Remote Sensing Applications, Phase I
(https://techport.nasa.gov/image/130968)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers

Target Destinations

Others Inside the Solar System, Outside the Solar System